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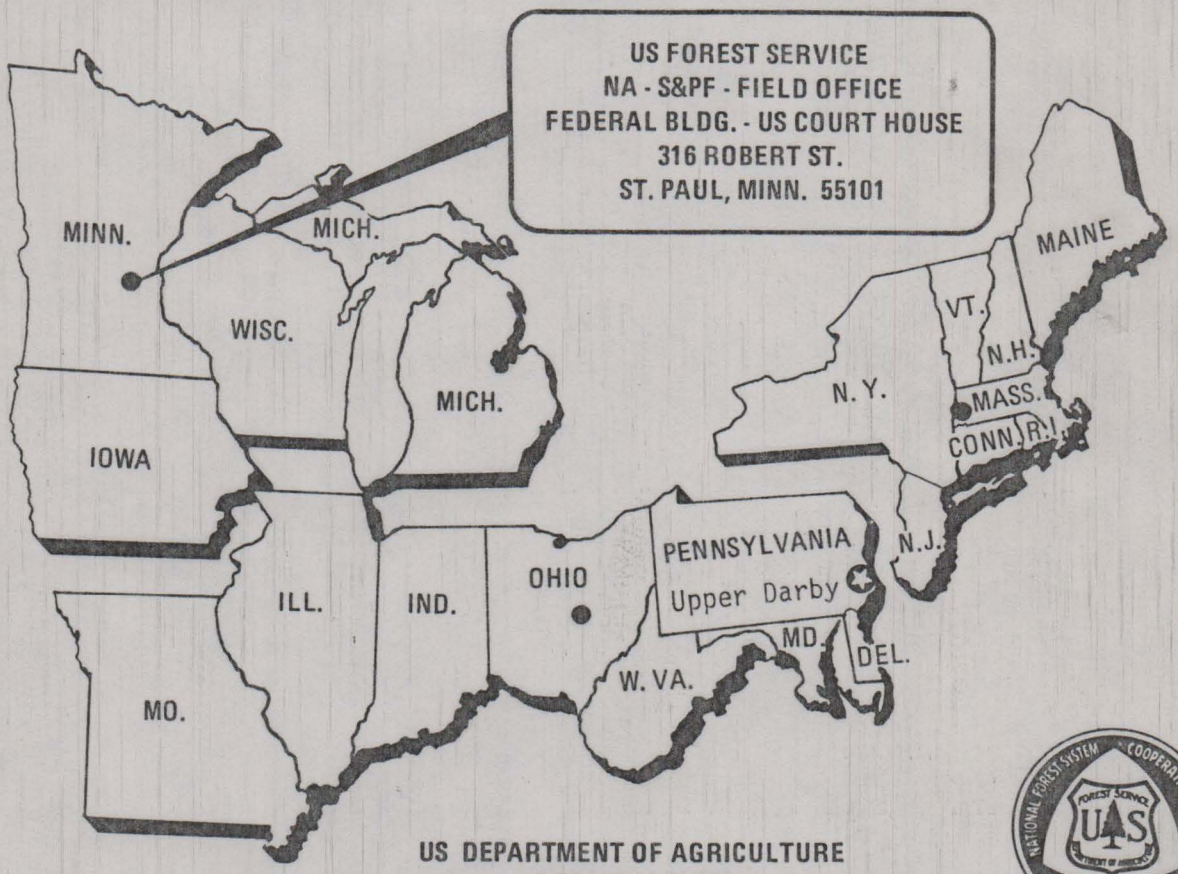
DIVISION OF FOREST PEST CONTROL

Northeastern Area State & Private Forestry

S-68-13 5230

BIOLOGICAL EVALUATION OF SARATOGA SPITTLEBUG AS BASED ON 1968 SCAR-COUNT SURVEYS ON NATIONAL FORESTS IN THE LAKE STATES

By Imants Millers, Entomologist



US DEPARTMENT OF AGRICULTURE
FOREST SERVICE

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SUMMARY

Scar-count surveys on 11, 241 acres in 239 red pine plantations revealed severe damage by Saratoga spittlebug, Aphrophora saratogensis Fitch, in the following Forests:

Chequamegon N. F.	314a
Chippewa N. F.	18a
Hiawatha N. F.	205a
Huron-Manistee N. F.	1225a
TOTAL	1762a

The above National Forests are advised to make a full evaluation of the infested plantations. If chemical suppression is proposed, a nymphal survey should be requested of the St. Paul Field Office.

INTRODUCTION

The Saratoga spittlebug, Aphrophora saratogensis Fitch, is one of the major pests of young red pine plantations in the Lake States. The scars caused by adult feeding on pine branches are used to estimate the spittlebug population. One season's estimates are used to predict the following year's population and damage. The scar-count surveys are made annually on selected susceptible red pine plantations in the National Forests of the Lake States. If an outbreak is detected, all the susceptible plantations in the vicinity are surveyed to determine its extent. Then the National Forests are advised to make a full evaluation, i.e. cost-benefit and adverse-effects, and decide for or against suppression. Nymphal surveys are planned for June to confirm anticipated outbreak populations in the areas where suppression is needed.

This report covers the biological evaluations of the Chequamegon, Chippewa, Hiawatha, Huron-Manistee, Nicolet, Ottawa and Superior National Forests. Except for the location and size of the areas involved, the ecological conditions, survey methods and recommendations are similar. In order to utilize more efficiently limited funds and manpower, all the evaluations are combined into one report.

TECHNICAL INFORMATION

A. Causal Agent

The Saratoga spittlebug, Aphrophora saratogensis (Fitch)

B. Host

Red pine, Pinus resinosa Ait
Alternate hosts are Comptonia sp., Rubus sp. and other woody shrubs. Other pines in the area may be attacked, but damage usually is not serious.

C. Type of Damage

The adult spittlebugs feed on 1-5 year internodes of branches and the main stem. Necrotic areas, i.e. scars, are produced in the phloem, cambium and new-formed xylem as a result of the feeding. One season's accumulation of 35 or more scars per 4 linear inches of twig interferes with food and water translocation. At first, stunting of terminal growth occurs. Continued severe feeding in successive years results in branch and terminal die-back, i.e. flagging, and eventually, tree mortality. Thus, economic loss occurs from tree growth reduction, poor tree form and quality, and tree mortality (Ewan, 1961).

D. Ecological Considerations

The Saratoga spittlebug outbreaks are greatly affected by the tree host-alternate host ratio and climatic conditions (Ewan, 1961).

Spittlebug eggs overwinter under bud scales of red pine on the branches of the upper crown. The young nymphs, immediately after hatching from eggs in May, drop from the tree and migrate to herbaceous plants. When about 2 weeks old they move to woody shrubs, particularly sweet fern, Comptonia sp., and raspberries, Rubus sp. Indications are that local alternate host preferences do occur. For example, on the Huron-Manistee N. F., spittlebug outbreaks have occurred only where sweet fern is present.

The spittlebug abundance is related to the host and alternate hosts available for oviposition, nymphal development and adult feeding. Generally, red pine plantations in the Lake States are susceptible to outbreak populations after the trees are 2 feet tall and until crown closure eliminates alternate hosts, i.e. tree height of about 14 feet with stocking at 1000 trees per acre. Damage to the tree occurs when nymphal survival results in adult population sufficient to cause more than 35 scars per 4 inches of twig. By causing tree stunting and mortality, unchecked spittlebug populations are able to maintain open red pine stands and thus prolong outbreak conditions. Other red pine pests, such as white grub, Scleroderris pine cander and defoliators may also produce conditions favorable to spittlebug outbreak.

Weather is another ecological factor that can have adverse affects on spittlebug populations. Spittlebug nymphs are relatively protected at the root collar of the alternate host. However, late spring temperatures in low 20's may cause nymphal mortality. Also, the nymphs are readily susceptible to dessication during first migration from red pine to herbaceous plants and later to woody shrubs.

Few parasites and predators are reported for Saratoga spittlebug, but none effectively reduce outbreak populations.

LOCATION AND OUTBREAK BY FORESTS

Annual Saratoga spittlebug scar-count surveys are made in selected plantations to detect outbreak populations and to evaluate their damage. The plantations are chosen so that all Districts with spittlebug history receive annual attention, but any one plantation is visited at 2-4 year intervals, depending on spittlebug damage.

The scar-count survey was made in the fall, after adult feeding is completed, i.e. after October 1. The survey was planned, directed and evaluated by the St. Paul Field Office. The field work was done by National Forest Staff. The survey methods are described in the Appendix. The following pages summarize the results of the survey by Forests.

The following comments apply to the columns and abbreviations in Tables 1-7:

District Id. No. - code designation of plantation; plantation or stand numbers

T/A - number of trees per acre

Ht. Ft. - average height of red pine in feet

Scars - the qualitative description of the approximate number of scars per sample twig (occasionally adjusted upward when local pockets are more severe)

- 0 - scars practically absent
- L - light; 1-5 scars
- LM - light to moderate; 6-10 scars
- M - moderate; 11-20 scars
- MH - moderate to heavy; 21-30 scars
- H - heavy, more than 30 scars

Recommendations - this is a resurvey recommendation as based on spittlebug scar counts, stocking and height of trees

- sc - scar-count is recommended for the year indicated
- Nymph - nymphal survey is recommended if chemical suppression is planned for the plantation
- Disc - further scar count surveys are to be discontinued, because the area is,
  - NM - non-manageable; poor stocking
  - NS - not susceptible to spittlebug damage (too tall)

CHEQUAMEGON NATIONAL FOREST

Area Surveyed: 2393 acres in 58 plantations
Outbreak area: 314 acres in 7 plantations

Recommendations:

1. Complete the Forest Insect Evaluation (FSM 5230) for the infested areas.
2. Request nymphal survey for June, if needed.

TABLE I. SARATOGA SPITTLEBUG 1968 SCAR-COUNT SURVEY RESULTS ON THE CHEQUAMEGON NATIONAL FOREST

PLANTATION LOCATION				AREA	TREES		SURVEY RESULTS	
DISTRICT ID. NO.	TOWN	RANGE	SECTION	ACRES	T/A	HT. FT.	SCARS	RECOMMENDATIONS
Hayward R.D.								
62v	41	6W	1	27	-	small	-	SC - '70
62v	41	6W	6	38	-	small	-	SC - '70
50a	42	5W	16	10	800	9	LM	SC - '71
47a	42	5W	25	5	-	14+	-	Disc - NS
62r	40	6W	27	9	-	-	-	Disc - NS
62z,y,w,	43	5W	14,15,22	50	-	-	-	Disc - NM
62x	43	5W	14	7	-	-	-	Disc - NM
Medford R.D.								
43	33	2W	26	17	300	3	L	SC - '72
37	33	1W	34	33	400	6	L	SC - '72
Glidden R.D.								
186	44	3W	28	15	-	2	-	SC - '70
85b	40	4W	15,16,21,22	59	540	3	L	SC - '72
85b	40	4W	21	13	250	3	L	SC - '72
85c	44	3W	11	3	800	3	L	SC - '72
27b	43	3W	6,7	25	-	-	-	Re SC - '72
27b	43	3W	7	33	-	-	-	Re SC - '72
85c	40	4W	22	9	Failed	-	-	Disc - NM
26a	43	3W	5,6	101	"	-	-	Disc - NM
26a	43,44	3W	31,6	7	"	-	-	Disc - NM
26a	43	3W	5	11	"	-	-	Disc - NM
85b	40,41	3W	6,31	20	"	-	-	Disc - NM

Note: Abbreviations are explained on page 4

Continued on next page.

TABLE I. SARATOGA SPITTLEBUG 1968 SCAR-COUNT SURVEY RESULTS ON THE CHEQUAMEGON NATIONAL FOREST (continued)

PLANTATION LOCATION				AREA	TREES		SURVEY RESULTS	
DISTRICT ID. NO.	TOWN	RANGE	SECTION	ACRES	T/A	HT. FT.	SCARS	RECOMMENDATIONS
Washburn R.D.								
91	44	8W	20	106	800	10	H	Nymph - '69
110c	45	8W	16SW	40	1100	5	H	Nymph - '69
110d	45	8W	7 NENE	7	1100	6	H	Nymph - '69
117a	46	8W	30SE	23	1200	5	H	Nymph - '69
b	46	8W	30SW	44	1000	4	M	Nymph - '69
c	46	8W	30 NE	32	1500	5	H	Nymph - '69
99	47	7W	2,10,11	62	800	5	MH	Nymph - '69
117d	45	8W	8,17	23	800	5	M	SC - '70
117e	45	8W	9,16	41	800	6	M	SC - '70
117f	45	8W	28NW	32	1400	5	M	SC - '70
100	46	8W	29E	92	600	6	M	SC - '70
116a(113c)	48	6W	13	153	1000	5	M	SC - '70
113a	48	6W	32	23	800	7	M	SC - '70
62e	49	6W	29	27	700	4	M	SC - '70
64	47	7W	9,10	30	1000	9	LM	SC - '71
62f	48	6W	17	25	500	3	LM	SC - '71
62a	48	6W	24	340	500	3	LM	SC - '71
113 b,d	48	6W	34	20	900	7	M	SC - '71
62c	49	6W	4	11	300	2	LM	SC - '71
108b	49	6W	34,35	27	1000	6	L	SC - '71
116c	44	7W	15,21	125	500	5	L	SC - '72
62g	48	6W	2,11,3,10	15	1100	3	L	SC - '72
62b	49	6W	3	210	400	2	L	SC - '72
62d	49	7W	33,34	98	600	3	L	SC - '72
116a	46	8W	21N	26	-	-	-	Disc - NM
97	48	7,6W	36,31	25	poor	-	-	Disc - NM
Park Falls R.D.								
65	39	2E	9	6	600	9	L	SC - '71
c59,60,61	39	2E	17,18	14	fail.	-	-	Disc - NM
72b	39	2E	9,10	39	"	-	-	Disc - NM
71	39	2E	30	10	"	-	-	Disc - NM
72b	39	2E	15,16,21	63	"	-	-	Disc - NM
72a	38	3E	25	3	"	-	-	Disc - NM
72a	38	3E	26	4	"	-	-	Disc - NM
72a	38	3E	24	12	"	-	-	Disc - NM
72a	40	3E	25,26	25	"	-	-	Disc - NM
15r,8r	40	3E	31	19	"	-	-	Disc - NM
72a	39	3E	34	4	"	-	-	Disc - NM
72a	39	3E	12	45	"	-	-	Disc - NM

Note: Abbreviations are explained on page 4

CHIPPEWA NATIONAL FOREST

Areas surveyed: 875 acres in 28 plantations
Outbreak area : 18 acres in 1 plantation (Walker R. D.)

Recommendations:

1. Complete the Forest Insect Evaluation (FSM 5230) for the infested plantation.
2. Request nymphal survey for June, if needed.

TABLE II. SARATOGA SPITTLEBUG 1968 SCAR-COUNT SURVEY RESULTS ON THE CHIPPEWA NATIONAL FOREST

PLANTATION LOCATION				AREA	TREES		SURVEY RESULTS	
DISTRICT ID. NO.	TOWN	RANGE	SECTION	ACRES	T/A	Ht. Ft.	SCARS	RECOMMENDATIONS
Bena R.D.								
39b	145	26	19,30	37	600	12	M	SC - '70
35b	145	29	14,15	50	500	14	L	Disc - NS
37b	145	29	14,23	28	500	17	-	Disc - NS
Blackduck R.D.								
23b	147	30	23	10	600	5	L	SC - '72
23b	147	30	25SWSW	8	500	6	L	SC - '71
23b	147	30	25NESW	30	900	7	L	SC - '71
23b	147	30	36SWNW	12	800	9	L	SC - '72
23b	147	30	36NESW	20	800	6	L	SC - '72
20b	148	29	8	20	500	20	-	Disc - NS
24k	148	31	9	27	800	5	L	SC - '72
Cass Lake R.D.								
168e	145	29	4,5,8,9	64	700	10	M	SC - '70
160c	145	31	36	57	600	12	M	SC - '70
164e	146	29	34,35	30	500	10	L	SC - '72
174e	146	30	13	30	800	3	L	SC - '72
Marcell R.D.								
41f	58	25	19	50	500	4	LM	SC - '71
40	147	25	13	60	200	2	L	SC - '72
41b	148	25	5	16	600	4	L	SC - '72
42a	148	25	9	35	700	3	LM	SC - '71
Remer R.D.								
25d	141	26	22,23	21	50	10	O	Disc - NM
20a	141	27	15	50	500	20	-	Disc - NS
22g	142	26	5,6	19	-	15	-	Disc - NS
22g	142	26	5,6	19	-	15	-	Disc - NS
26b	142	27	14,15	12	poor	-	-	Disc - NM
16	141	29	21	25	800	20	-	Disc NS
Walker R.D.								
21c	141	29	25W	45	500	7	M	SC - '70
21b	141	29	25SE	6	500	7	L	SC - '71
21a	141	29	26,27,35	29	600	10	M	SC - '70
21d	141	31	19	18	700	10	H	Nymph - '69
28	142	28	36	66	800	4	O	SC - '72

Note: Abbreviations are explained on page 4

HIAWATHA NATIONAL FOREST

Area surveyed: 675 acres in 18 plantations
Outbreak area: 205 acres in 3 plantations

Recommendations:

1. Complete the Forest Insect Evaluation (FSM 5230) for the outbreak area.
2. Request nymphal survey for June, if needed.

TABLE III. SARATOGA SPITTLEBUG SCAR-COUNT SURVEY RESULTS FOR 1968--HIAWATHA NATIONAL FOREST, RAPID RIVER RANGER DISTRICT

PLANTATION LOCATION				AREA	TREES		SURVEY RESULTS	
DISTRICT ID. NO.	TOWN	RANGE	SECTION	ACRES	T/A	HT. FT.	SCARS	RECOMMENDATIONS
Rapid River R.D.								
128a	41	21	1,2	40	700	4	H	Nymph - '69
128a	41	21	11	75	700	3	H	Nymph - '69
17ab,20a	40,41	22	5,34	90	500	5	H	Nymph - '69
126 i	42	20	2	6	800	8	M	SC - '69
126a	40	21,22	30,25	15	700	5	M	SC - '69
126b,c,d	40	21	19	42	800	6	M	SC - '69
126j	40	21	18	23	800	5	M	SC - '70
124b,c,d	41	21	22	68	600	6	M	SC - '70
124a	40,41	21,34	5,33,34	52	200	6	M	SC - '70
127a	42	20	6	14	500	5	L	SC '71
126g h	43	20	35	40	700	6	L	SC '71
127a	39	21	26	19	700	6	O	Disc - NS
127a b	41	22	22	9	-	7	-	Disc - NM
123b	43	20	23	11	900	9	L	Disc - NS
123a b c d	41	22	23	11	1000	8	L	Disc - NS
126e	43	20	8	27	800	9	O	Disc - NS
115a b	43	21	23	59	900	12	O	Disc - NS
126k	40	21	18,19	70	N½ 150	3	M	Disc - NM
					S½ 400	3	M	SC - '70

Note: Abbreviations are explained on page 4

HURON-MANISTEE NATIONAL FOREST

Area surveyed: 4575 acres in 54 plantations
Outbreak area: 1225 acres in 16 plantations

Recommendations:

1. Complete the Forest Insect Evaluation (FSM 5230) for the infested area.
2. Request nymphal survey for June, if needed.

A major outbreak is located on the Harrisville R. D. where 1042 acres out of 3843 acres examined were found infested. Since additional areas are likely to be infested, the Forest was advised to scar-count survey all susceptible red pine plantations on the District. The results will be evaluated when the survey is completed.

TABLE IV. SARATOGA SPITTLEBUG SCAR-COUNT SURVEY RESULTS FOR 1968 HURON-MANISTEE NATIONAL FOREST

PLANTATION LOCATION				AREA	TREES		SURVEY RESULTS	
DISTRICT ID. NO.	TOWN	RANGE	SECTION	ACRES	T/A	HT. FT.	SCARS	RECOMMENDATIONS
Baldwin R.D.								
P41	18	14	17	15	600	7	H	Nymph - '69
	19	14	30	31	400	12	MH	Nymph - '69
Manistee R.D.								
P67a	20	14	28	25	800	3	M	SC - '70
P65b	20	17	31	35	700	2	L	SC - '72
P65a	20	13	15	12	800	3	L	SC - '72
P67b	20	15	34/35	100	700	2	L	SC - '72
P65c	20	17	9	35	800	3	L	SC - '72
P65d	20	17	15	30	Poor	1	-	Disc - NM
White Cloud R.D.								
P27	14	15	8	67	900	7	M	SC - '70
P27	12	15	33	57	700	5	L	SC - '72
P27	11	15	4	57	700	5	L	SC - '72
Tawas R.D.								
18	24	4E	24,25	25	-	8	H	Nymph - '69
7	23	7E	29	60	-	2	O	SC - '72
4	23	7E	10	50	-	2	O	SC - '72
1	24	7E	25	72	-	2	O	SC - '72
5,6,7,9,10	24	6E	6	180	-	2	L	SC - '72
2	23	7E	23,14	145	-	12	O	Disc - NS
5	24	4E	14	30	poor	3	O	Disc NS

Note: Abbreviations are explained on page 4

Continued on next page

TABLE IV. SARATOGA SPITTLEBUG SCAR-COUNT SURVEY RESULTS FOR 1968 HURON-MANISTEE NATIONAL FOREST (continued)

PLANTATION LOCATION				AREA	TREES		SURVEY RESULTS	
DISTRICT ID. NO.	TOWN	RANGE	SECTION	ACRES	T/A	HT. FT.	SCARS	RECOMMENDATIONS
Mio								
-	25	2E	8NWSW	12	-	4	H	Nymph - '69
-	26	1E	11,14	40	-	6	H	Nymph - '69
-	26	1W	23	60	-	5	H	Nymph - '69
12	26	1W	14	30	-	4	M	SC - '70
2,9,	26	1E	28	41	-	3	L	SC - '70
11	25	2E	7	100	-	2	-	SC - '71
11,5,10	25	1W	24	150	-	1	-	SC - '72
4,11,12	26	1E	23	150	500	3	L	SC - '72
4	26	2W	18	94	-	3	L	SC - '72
1,6	26	1W	11,12,14	146	-	4	L	SC - '72
Harrisville R.D.								
	26	6	1	80	-	10	H	Nymph - '69
P-11	26	6	17	20	-	7	H	Nymph - '69
P-13 & 16	26	6	28	70	500	8	H	Nymph - '69
P 13	26	6	19	80	-	6	H	Nymph - '69
24 & 26	26	7	20	34	-	8	H	Nymph - '69
P 11	26	7	3	80	-	9	H	Nympn - '69
	26	7	21-22	378	-	12	H	Nymph - '69
27	26	8	8	208	-	10	H	Nymph - '69
3	26	8	4	38	-	10	H	Nymph - '69
13 &14	26	8	9	54	-	10	H	Nymph - '69
P 56	25	7	1	40	1000	6	L	SC - '71
183-13	25	7	19/30	216	1200	8	L	SC - '71
-	26	8	8	109	-	1	-	SC - '71
-	26	8	5	120	-	1	-	SC - '71
60-13	25	4	28 N/2	65	-	-	-	SC - '72
P 52a	25	5	15	168	600	11	L	Disc - NS
175-2	25	5	20/21	80	-	14+	-	Disc - NS
205-4	25	5	34	168	800	14+	-	Disc - NS
-	25	7	15/16	166	200?	5	L	Disc - NM
129-2	26	7	23	61	-	14+	-	Disc - NS
125-26	26	7	30	32	-	16+	-	Disc - NS
P 5a	26	7	27	77	-	15+	-	Disc - NS

Note: Abbreviations are explained on page 4.

NICOLET NATIONAL FOREST

Area surveyed: 619 acres in 26 plantations
Outbreak area: None

Recommendations:

None

TABLE V. SARATOGA SPITTLEBUG SCAR-COUNT SURVEY RESULTS FOR 1968--NICOLET NATIONAL FOREST

PLANTATION LOCATION				AREA	TREES		SURVEY RESULTS	
DISTRICT ID. NO.	TOWN	RANGE	SECTION	ACRES	T/A	HT. FT.	SCARS	RECOMMENDATIONS
Eagle River R.D.								
51b	41	11	27	10	700	3	M	SC - '69
7a	40	15	18	3	1400	3	L	SC - '72
7b	39	15	1	19	poor	-	-	Disc - NM
7c	39	15	10,11	26	poor	-	-	Disc - NM
Lakewood R.D.								
5a	31	15	15	18	900	6	MH	SC - '69
2	32	16	33	22	1000	12	MH	SC - '69
2	33	17	29	5	900	13	MH	SC - '69
22b	31	15	6	83	900	11	M	SC - '70
8a	32	14	36	22	1000	5	M	SC - '70
7a	32	17	17	21	1000	8	M	SC - '70
9e	31	15	14,15,23	116	-	2	-	SC - '71
2	33	17	4	71	800	8	M	SC - '71
1	31	15	19	43	1700	16	-	Disc - 'NS
2	31	17	8	12	-	16	-	Disc - 'NS
31	31	17	18	16	-	20	-	Disc - 'NS
Florence R.D.								
7a	40	15	18	3	1400	3	L	SC - '72
7c	39	15	10,11	26	poor	-	-	Disc - NM
7b	39	15	1	19	poor	-	-	Disc NM
Three Lakes R.D.								
2	38	12	9	20	300	4	L	SC - '71
46b	39	12	2,3	14	400	5	O	SC '71
49b	39	14	19	15	400	2	-	SC - '71
6	38	12	16	13	300	2	O	SC - '72
51a	38	12	15	35	poor	-	-	Disc - NM
Laona R.D.								
4c	35	15	8	5	1100	7	L	SC - '71
5c	34	15	7	5	1000	6	L	SC - '72
5c	34	15	33NW	12	800	5	L	SC - '72
4b	34	15	33NWSE	7	800	6	L	SC - '72
4e	34	14	5	3	-	-	-	Disc - NM
4d	34	14	5	3	-	-	-	Disc - NM

Note: Abbreviations are explained on page 4

OTTAWA NATIONAL FOREST

Area Surveyed: 1364 acres in 29 plantations
Outbreak area: None

Recommendations:

None

TABLE VI. SARATOGA SPITTLEBUG SCAR-COUNT SURVEY RESULTS FOR 1968 OTTAWA NATIONAL FOREST

PLANTATION LOCATION				AREA	TREES		SURVEY RESULTS	
DISTRICT ID. NO.	TOWN	RANGE	SECTION	ACRES	T/A	HT. FT.	SCARS	RECOMMENDATIONS
Bessemer R.D.								
2015g	45	42	16SW	11	800	4	M	SC - '70
9b repl	45	42	16SW	19	800	3	O	SC - '72
2015e	45	42	17,18,20	64	800	3	L	SC - '72
d	45	42	22,27	57	800	4	L	SC - '72
a	45	43	7,12W	19	700	4	L	SC - '72
b	45	44	11,12	22	700	3	L	SC - '72
f	46	44	23SE	22	700	3	O	SC - '72
2014b	46	44	13,14,23,24	89	700	3	L	SC - '72
2015c	46	44	34	18	800	4	O	SC - '72
2014a	46	44	14	53	poor	-	-	Disc - NM
2014c	46	44	15,22	68	poor	-	-	Disc - NM
Ontonogan R.D.								
5011a	50	35	36	12	-	3	M	SC - '70
67a	50	37	17	13	300	3	L	SC - '72
5012a	49	38	12	91	poor	-	-	Disc - NM
Iron River R.D.								
3026b	43	36	30	24	800	2	L	SC - '72
3026a	42	37	1	45	700	2	L	SC - '72
3026e	43	36	20	35	700	3	L	SC - '72
3026d	43	36	20	7	700	2	O	Disc - NM
3026c	43	36-37	31,30,36	81	poor	-	-	Disc - NM
Watersmeet R.D.								
6008	44	38	19SW	11	900	3	L	SC - '72
6018b	47	39	20,28,29	106	700	4	L	SC - '72
14b	44	38	24,25,26	280	-	16+	L	Disc - NS
30	45	39	33	12	-	16+	-	Disc - NS
33	46	38	30	71	-	16+	-	Disc - NS
33	46	39	25	20	-	16+	-	Disc - NS
6000	44	39	16	10	-	16+	-	Disc - NS
6003	44	39	35	53	-	16+	-	Disc - NS
6008	44	38	30	7	-	16+	-	Disc - NS
6018a	45	38	27	44	poor	-	-	Disc NM

Note: Abbreviations are explained on page 4

SUPERIOR NATIONAL FOREST

Area surveyed: 774 acres in 27 plantations
Outbreak area: None

This was the first scar-count survey on the Forest. It showed that the spittlebug is present in most areas, and a few plantations have moderate populations.

Recommendations:

Annual scar-count survey of selected plantations should be continued to locate potential problem areas and to evaluate the populations in those areas.

TABLE VII. SARATOGA SPITTLEBUG SCAR-COUNT SURVEYS FOR 1968 SUPERIOR NATIONAL FOREST

PLANTATION LOCATION				AREA	TREES		SURVEY RESULTS	
DISTRICT ID. NO.	TOWN	RANGE	SECTION	ACRES	T/A	HT. FT.	SCARS	RECOMMENDATIONS
Aurora R.D.								
19	56	14	5	15	sparse	2'	-	Disc - NM
28a	56	14	4	85	"	6	-	Disc - NM
Gunflint R.D.								
38g	63	1W	11	25	422	4	L	SC - '72
42e	64	2E	32	26	188	3	L	SC - '72
276	63	2E	11	26	250	8-15	VL	Disc - NM
Halfway R.D.								
24b	62	10	30	47	1050	6	M	SC - '70
47a	61	9	29-30	46	1230	4	M	SC - '70
26b	62	10	19,20	17	1000	7	LM	SC - '71
19	61	11	11	16	250	10	M	Disc - NS
30b	61	9	28,32,33	57	690	10'	LM	Disc - NS
Isabella R.D.								
42d	60	7	2,3	37	-	6'	LM	SC - '71
25i	60	8	13	25	1100	16+	-	Disc - NS
33g	61	8	36	15	33	-	-	Disc - NM
46c	59	9	21	30	sparse	3'	L	Disc - NM
Kawishiwi R.D.								
30a	65	13	20	10	245	6'	M	SC - '70
29	65	13	20	12	-	-	-	Disc - NM

Note: Abbreviations are explained on page 4

Continued on next page.

TABLE VII. SARATOGA SPITTLEBUG SCAR-COUNT SURVEYS FOR 1968 SUPERIOR NATIONAL FOREST (continued)

PLANTATION LOCATION				AREA	TREES		SURVEY RESULTS	
DISTRICT ID. NO.	TOWN	RANGE	SECTION	ACRES	T/A	HT. FT.	SCARS	RECOMMENDATIONS
LaCroix R.D.								
32c	65	16	23	31	-	4	MH	SC - '69
19c	65	16	25,26	24	700	14	LM	Disc - NS
Tofte R.D.								
39a	61,62	5	6,31	26	Good	7	L	SC - '72
59a	61	3	22,27	35	Fair	7	L	SC - '72
39a	61,62	5	6,31	26	Good	12'	L	Disc - NS
Two Harbors R.D.								
25b	58	10	32	19	-	4	L	SC - '72
19a	56	12	1	13	-	12'	L	Disc - NS
Virginia R.D.								
41b	60	20	14	24	300	6'	L	SC - '72
34a	60	19	23	21	-	14'	L	SC - '72
45d	60	18	23,26	25	100	3'	L	Disc - NM

Note: Abbreviations are explained on page 4

DISCUSSION

The Saratoga spittlebug was found in outbreak status on the Chequamegon, Chippewa, Hiawatha and Huron-Manistee National Forests. The Harrisville Ranger District, Huron-Manistee, has a major outbreak, and the full extend of it will be known only after the additional scar-count surveys are completed. The first spittlebug survey on the Superior National Forest indicates that the pest is present throughout the area, but none of the plantations is in immediate danger.

The Forests are advised to make full evaluations for the outbreak areas and consider chemical suppression.

Saratoga spittlebug may be controlled with Malathion LVC at 10 fl. oz. per acre applied by aircraft. Small areas can be treated with ½lb. malathion in 1 gallon oil or water per acre applied with a back-pack mistblower. The suppression costs depend on the size of the area to be treated. A small area of 100 acres may cost about $5.00 per acre, while a large project involving over 1,000 acres may cost only $2.50 per acres.

Spraying is timed to get the adult spittlebugs before they lay eggs. As a general rule, 90 percent of the nymphs should be transformed into adults before treatment. Usually, spraying takes place in the last 2 weeks of July.

Malathion is a relatively safe insecticide when applied at recommended rates. However, spraying open waters should be avoided and label warnings for handling must be followed. Malathion is highly toxic to bees and bee keepers in the area should be contacted prior to spraying. The LVC application will damage acrylic paints, such as used by General Motors cars.

LITERATURE CITED

EWAN, H. G. 1961. The Saratoga spittlebug. USDA Forest Service, Tech. Bull. 1250. 52 pp.

MILLERS, I. and L. F. Wilson. 1965. Suppression of the Saratoga spittlebug, Aphrophora saratogensis (Fitch), with malathion in Michigan pine plantations. Jour. Econ. Ent. 58(5):942-944

APPENDIX

SCAR-COUNT SURVEY METHOD

The basic concepts of the scar-count survey method were developed by Ewan (1961). Briefly, the spittlebug adult feeding causes necrotic areas, called scars, in the outer xylem tissues of red pine branches. The scar-count density is related to the number of bugs that were feeding and to the severity of the damage incurred. A scar-count density of 35 or more scars on 4" long twig is considered high and interferance with normal vascular conduction can be expected.

Plantation Selection:

The St. Paul Field Office maintains an Atlas that lists all red pine plantations susceptible to Saratoga spittlebug. Annually, sample plantations are selected for scar-count survey. The selection is based on general location, previous year of survey and survey recommendations made at that time. Generally, a plantation is re-examined every 2-4 years, until an outbreak population is detected.

Survey Technique:

A Saratoga spittlebug scar-count survey form is prepared for each plantation. It gives the legal description and a map of the plantation. Additional information recorded in the field includes acreage, height and stocking of trees, and scar-counts at each sample location.

The sample plots are laid out so that the examiner sees most of the plantation during the survey. A minimum of 10 and a maximum of 40 samples are taken from each plantation, depending on its size. The survey lines and plot locations are identified on the map.

Each sample plot consists of one red pine tree. A sample twig is cut from penultimate (next to the last) internode of an upper half branch. A 4 inch long section is marked, peeled and the scars counted. The total number, or 30 + scars where applicable, are recorded on the survey form. Supplemental notes are added on the tree vigor and damage from other pests.

Personnel:

The National Forest personnel conduct the field survey, after they are trained by the St. Paul Field Office.

Timing:

Scar-count surveys are made after October 1, but must be completed before April. The 1968 surveys were made during October and November, 1968.

Evaluation of Field Data:

The scar-count survey forms are examined by Entomologists of the St. Paul Field Office. Evaluations and recommendations are based on the number of scars per sample twig and the number of samples in the high scar counts (30+). Plantations for which nymphal surveys are recommended are in immediate danger of damage and the land manager is asked to evaluate the need for suppression.

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